IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of:	Teresa H. Meng, et al.	: Art Unit: 2611
Filed:	12 October 1999	: Examiner: E.Y. Z. Puente
Serial Number:	09/416,098	: Before the Board of Appeals : Appeal No.
Title:	METHOD AND APPARATUS FOR ELIMINATING THE EFFECTS OF FREQUENCY OFFSETS IN A DIGITAL COMMUNICATION SYSTEM	

TRANSMITTAL OF APPEAL BRIEF

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Board of Appeals
P.O. Box 1450
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Sir:

The following papers and fees are being submitted herewith for entry in the above-referenced Patent Application:

1. Appeal Brief with appendices;
2. Request and fee for three (3) month Extension of Time to file the Appeal Brief; and,

3. A check payable to the Director of Patents and Trademarks in the amount of $1560.00 (to cover the filing fee for a Brief in Support of an Appeal of $510.00, plus the fee for three month Extension of Time of $1050.00).

Respectfully submitted,
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APPEAL BRIEF

REAL PARTY IN INTEREST

Atheros Communications, Inc. is the Assignee of record of the above-referenced Patent Application. The Assignment is recorded at the USPTO on Reel/Frame 012791/0095.

RELATED APPEALS AND INTERFERENCES

A Notice of Appeal from the Examiner to the Board of Patent Appeals and Interferences related to the subject Patent Application was filed on 7 November 2007 along with a Pre-Appeal Brief Request for Review and a Pre-Appeal Brief. A Notice of Panel Decision from Pre-Appeal Brief Review, mailed 20 December 2007, Responded with a decision that the Appeal should proceed to the Board of Patent Appeals and Interferences, and reset the time period for filing an appeal brief to one month from the mailing of that decision, extendable under 37 C.F.R. § 1.136.

STATUS OF CLAIMS

Claims allowed

None.

Claims objected to

None.

Claims rejected (See Claims of Appeal Appendix)

Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 are rejected under 35 U.S.C. § 112, first paragraph, as claiming subject matter not found in the original disclosure. Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 are rejected under 35 U.S.C. § 112, second paragraph, as claiming subject matter that fails to correspond in scope with that which applicants regard as the invention.

Claims pending

1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35

Claims appealed

1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35

Claims canceled

2, 3, 6, 7, 10-14, 16, 17, 20, 21, 24-28, 30, 32 and 33

STATUS OF AMENDMENTS

The Claims were last amended in an Amendment after a Final Office Action, filed on 11 December 2006. A Response to an Office Action issued subsequent to an RCE resulted in the Final Rejection made in the Office Action dated 7 August 2007.

SUMMARY OF THE CLAIMED SUBJECT MATTER

Subject matter defined in Independent Claim 1

A device adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA (shown in FIG. 1 and introduced on page 7, line 5 - page 8, line 3). The device comprises:

a first transceiver unit 120 (presented in FIG. 1, and described on page 5) operable to communicate in continuous bi-directional manner for the direct exchange of information with a second transceiver unit 100 using a common carrier frequency and a common sampling frequency (described on page 5, lines 10-17);

means for detecting FLL202, FLL602, 408, 702, 802, 902 responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units

120, 100 in at least one first signal transmitted by the first transceiver unit 120 and received by the second transceiver unit 100 disposed remotely therefrom (described on page 8, lines 8-12; page 11, lines 10-11; page 12, lines 18-22; page 14, lines 14-15 and lines 19-21; page 15, lines 18-20; page 16, lines 2-5);

means for adjusting the common carrier 204, 304, C_c/604/606 and sampling frequencies 404, 506, 1002 in accordance with the offsets detected responsive to the continuous comparison of received and detected signals in at least one second signal to be transmitted by the second transceiver unit 100 and to be received by the first transceiver unit 120 to correct for errors in the carrier frequency and sampling frequency references used locally at the first transceiver unit 120, so that the effects of the offsets to be perceived by the first transceiver unit 120 will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the first transceiver unit 120 (described on page10, lines 3-9; page 11, line 18 - page 12, line 6; page 12, line 22 - page 13, line 10; page 17, lines 15-19).

Subject matter defined in dependent Claim 4

The device, wherein the means for detecting the offsets 202 includes means for performing a correlation FLL202 on a digital representation of the first signal so as to lock onto the offset in the carrier frequency (page 8, lines 17-20).

Subject matter defined in dependent Claim 5

The device, wherein the means for adjusting the common frequencies includes means 304 for digitally shifting data in frequency to be transmitted in accordance with the carrier frequency and the offset corresponding thereto (page10, lines 3-9).

Subject matter defined in dependent Claim 8

The device, wherein the means for detecting the offsets includes means for locking onto the offset in the carrier frequency FLL202 and for producing an output signal corresponding thereto (page 9, lines 10-11).

Subject matter defined in dependent Claim 9

The device, wherein the means for adjusting the common frequencies C_c/604/606 includes means C_c for variably adjusting a reference frequency output by a crystal oscillator 604 in accordance with the output signal generated by the locking means FLL602 (page 12, line 22 - page 13, line 10).

Subject matter defined in Independent Claim 15

A method adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA, wherein the communication system comprises a first transceiver unit 120 operable to communicate in continuous bi-directional manner for the direct exchange of information with a second transceiver unit 100 using a common carrier frequency and a common sampling frequency (shown in FIG. 1 and introduced on page 7, line 5 - page 8, line 3). The method comprising:

detecting FLL202, FLL602, 408, 702, 802, 902 responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units 120, 100 in at least a first signal transmitted by the first 120 transceiver unit and received by the second transceiver unit 100 disposed remotely therefrom (described on page 8, lines 8-12; page 11, lines 10-11; page 12, lines 18-22; page 14, lines 14-15, lines 19-21; page 15, lines 18-20; page 16, lines 2-5); and,

adjusting the common carrier 204, 304, C_c/604/606 and sampling frequencies 404, 506, 1002 in accordance with the offsets detected responsive to continuous comparison of received and detected signals in at least one second signal to be transmitted by the second transceiver unit 100 and to be received by the first transceiver unit 120 to correct for errors in the carrier frequency and sampling frequency references used locally at the first transceiver unit 120, so that

the effects of the offsets to be perceived by the first transceiver unit 120 will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the first transceiver unit 120 (described on page10, lines 3-9; page 11, line 18 - page 12, line 6; page 12, line 22 - page 13, line 10, page 17, lines 15-19).

Subject matter defined in dependent Claim 18

The method, wherein the step of detecting the offsets includes performing a correlation on a digital representation of the first signal so as to lock onto the offset in the carrier frequency (page 8, lines 17-20).

Subject matter defined in dependent Claim 19

The method, wherein the step of adjusting the common frequencies includes digitally shifting data in frequency to be transmitted in accordance with the carrier frequency and the offset corresponding thereto (page10, lines 3-9).

Subject matter defined in dependent Claim 22

The method, wherein the step of detecting the offsets includes locking onto the offset in the carrier frequency and producing an output signal corresponding thereto (page 9, lines 10-11).

Subject matter defined in dependent Claim 23

The method, wherein the step of adjusting the common frequencies includes variably adjusting a reference frequency output by a crystal oscillator in accordance with the output signal generated by the locking means (page 12, line 22 - page 13, line 10).

Subject matter defined in Independent Claim 29

A device adapted to be used in a first transceiver unit 120 that can communicate with a second transceiver 100 unit using a common carrier frequency and a common sampling frequency (shown in FIG. 1 and introduced on page 7, line 5 - page 8, line 3 and page 17, line 20 - page 18, line 4). The device comprising:

a frequency lock loop FLL202, FLL602 and a delay lock loop 408, 702/704/706, 802/804/806, 902/904/908 respectively coupled to receive digital representations of at least one first signal transmitted by the second transceiver

unit 100, the frequency and delay lock loops FLL202, FLL602; 408, 702/704/706, 802/804/806, 902/904/908 being adapted to detect comparative carrier and sampling frequency offsets in the first signal and to produce offset information corresponding thereto indicative of offsets between respective common frequency references locally used for the carrier and sampling frequencies at the first and second transceiver units 120, 100 (described on page 8, lines 8-15; page 11, lines 10-11; page 12, lines 18-22; page 14, lines 14-15 and lines 19-21; page 15, lines 18-20; page 16, lines 2-5); and

a frequency shift block 304 and a timing acquisition unit 506, 1008 coupled to receive the offset information and digital data to be transmitted by the first transceiver unit 120 in at least one second signal to be received by the second transceiver unit 100 disposed remotely therefrom, the frequency shift block 304 and timing acquisition unit 506, 1008 being respectively adapted to digitally shift and sample the digital data in frequency in accordance with the common frequencies and frequency offsets corresponding thereto to correct for errors in the carrier and sampling frequency references used locally at the second transceiver unit 100, so that the effects of the carrier and sampling frequency offsets to be perceived by the second transceiver unit 100 will be substantially reduced in preemptive manner for continuous wireless bi-directional communication between the first and second transceiver units 120, 100 for the direct exchange of information (described on page10, lines 3-9; page 11, line 18 - page 12, line 6; page 12, line 22 - page 13, line 10; page 17, lines 15-19).

Subject matter defined in Independent Claim 31

A device adapted to be used in a first transceiver unit 120 that can communicate with a second transceiver unit 100 disposed remotely therefrom using a common carrier frequency and a common sampling frequency (shown in FIG. 1 and introduced on page 7, line 5 - page 8, line 3). The device comprising:

a frequency lock loop FLL202, FLL602 and a delay lock loop 408, 702/704/706, 802/804/806, 902/904/908 respectively coupled to receive digital representations of at least one first signal transmitted by the second transceiver unit 100, the frequency and delay lock loops FLL202, FLL602, 408, 702/704/706, 802/804/806, 902/904/908 being adapted to detect comparative carrier and sampling frequency offsets in the first signal and to produce analog offset signals corresponding thereto indicative of offsets between respective common frequency references 604, 706, 806, 908, 1004 locally used for the carrier and sampling frequencies at the first and second transceiver units 120, 100 (described on page 8, lines 8-15; page 11, lines 10-11; page 12, lines 18-22; page 13, lines 6-10; page 14, lines 10-15 and line 19 - page 15, line 4; page 15, lines 18-22; page 16, lines 2-5, page 17, lines 15-19);

a crystal oscillator 604 that supplies a reference frequency for modulating at least one second signal to be perceived by the second transceiver unit 100 in accordance with the common carrier frequency (page 12, line 22 - page 13, line 3); and

variably adjustable devices C_c coupled to receive the offset signals, the variably adjustable devices being respectively adapted to adjust the reference frequency of the crystal oscillator 604 and a sampling clock 806, 908 of an analog-to-digital converter in accordance with the offset signals to correct for errors in the carrier and sampling frequency references used locally at the second transceiver unit 100, so that the effects of the carrier and sampling frequency offsets in the second signal to be perceived by the second transceiver unit 100 will be substantially reduced in preemptive manner for continuous wireless bi-directional communication between the first and second transceiver units for the direct exchange of information (page 12, line 22 - page 16, line 11.

Subject matter defined in Independent Claim 34

A device adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA (shown in FIG. 1 and introduced on page 7, line 5 - page 8, line 3). The device comprising:

a first transceiver unit 100 operable to communicates in continuous bi-directional manner for the direct exchange of information with a second transceiver unit 120 using a common carrier frequency and a common sampling frequency (described on page 5, lines 10-17);

means for detecting FLL202, FLL602, 408, 702, 802, 902 responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units 100, 120 in at least one first signal transmitted by the first transceiver unit 100 and received by the second transceiver unit 120 disposed remotely therefrom (described on page 8, lines 8-12; page 11, lines 10-11; page 12, lines 18-22; page 14, lines 14-15 and lines 19-21; page 15, lines 18-20; page 16, lines 2-5);

means for communicating information corresponding to the detected offsets from the second transceiver unit 120 to the first transceiver unit 100 (page 18, line 19 - page 19, line 4); and,

means for adjusting the common carrier 204, 304, C_c/604/606 and sampling frequencies 404, 506, 1002 in accordance with the offsets detected responsive to continuous comparison of received and detected signals in at least one second signal to be transmitted by the first transceiver unit 100 and to be received by the second transceiver unit 120 to correct for errors in the carrier frequency and sampling frequency references used locally at the second transceiver unit 120, so that the effects of the offsets to be perceived by the second transceiver unit 120 will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the second

transceiver unit 120 (described on page10, lines 3-9; page 11, line 18 - page 12, line 6; page 12, line 22 - page 13, line 10; page 17, lines 15-19).

Subject matter defined in Independent Claim 35

A device adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA (shown in FIG. 1 and introduced on page 7, line 5 - page 8, line 3). The device comprising:

a first transceiver unit 100 operable to communicate in continuous bi-directional manner for the direct exchange of information with a second transceiver unit 120 using a common carrier frequency and a common sampling frequency (described on page 5, lines 10-17);

means for detecting FLL202, FLL602, 408, 702, 802, 902 responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units 100, 120 in at least one first signal transmitted by the first transceiver unit 100 and received by the second transceiver unit 120 disposed remotely therefrom (described on page 8, lines 8-12; page 11, lines 10-11; page 12, lines 18-22; page 14, lines 14-15 and lines 19-21; page 15, lines 18-20; page 16, lines 2-5);

means for communicating information corresponding to the detected offsets from the second transceiver unit 120 to the first transceiver unit 100 (page 18, line 19 - page 19, line 4); and,

means for adjusting the common carrier 204, 304, C_c/604/606 and sampling frequencies 404, 506, 1002 in accordance with the offsets detected responsive to continuous comparison of received and detected signals in at least one second signal to be transmitted by the second transceiver unit 120 and to be received by the first transceiver unit 100 to correct for errors in the carrier frequency and sampling frequency references used locally at the first transceiver unit 100, so that the effects of the offsets to be perceived by the first transceiver unit 100 will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the first transceiver unit 100 (described on page10, lines 3-9; page 11, line 18 - page 12, line 6; page 12, line 22 - page 13, line 10; page 17, lines 15-19).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Examiner rejected Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The Examiner stated that the claimed subject matter of "using a common carrier frequency and a common sampling frequency"; "adjusting the common carrier and sampling frequencies"; "correct for errors in the carrier frequency and sampling frequency"; "a frequency lock loop and a delay lock loop"; "a frequency shift block and a timing acquisition unit" was not found in the original disclosure and therefore considered new matter. The Examiner further stated that the original disclosure clearly stated that there was a first embodiment for digital correction of carrier frequency offsets; and a second embodiment for digital correction of sampling frequency offsets.

The Examiner further rejected Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 under 35 U.S.C. § 112, second paragraph, as failing to set forth the subject matter which applicants regard as their invention. The Examiner stated that the original disclosure clearly stated that there was a first embodiment for digital correction of carrier frequency offsets; and a second embodiment for digital correction of sampling frequency offsets. The Examiner concluded that the two different embodiments were improper to combine together in a single claim.

ARGUMENT

Rejection of Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 under 35 U.S.C. § 112, first paragraph.

It is respectfully submitted that the original disclosure describes "using a common carrier frequency" in its disclosure of shifting of the frequency of the data transmitted from one transceiver to another in correspondence to the detected frequency offset in the carrier of the signal received from the other transceiver, page 5, lines 10-17 and page 10, lines 1-9. It is also submitted that the originally filed Application disclosed "using a common sampling frequency" in its description of transmitting a sample frequency-corrected signal to another transceiver in correspondence to the detected sampling frequency offset in the data received from the other transceiver, page 5, lines 10-17; page 11, line 16 - page 12, line 14; and page 17, lines 6-19. Likewise, correcting for errors in the carrier frequency is disclosed, for example, in the detected carrier frequency offset being used by the frequency locked loop to cancel that offset (page 9, lines 8-11) and the detected offset being used by frequency shift block 304 to shift the frequency of the transmitted signal an equivalent amount (page 10, lines 1-9). Correcting for errors in the sampling frequency is disclosed by the detection of the sampling error using delay-lock loop 408 and then using the timing offset $\delta\tau$ and applying that that timing offset to the rate-conversion and interpolation block 506, page 11, line 8 - page 12, line 12, as one example. A frequency lock loop 202, 602 is disclosed

in each of FIGS. 2 and 6, page 9, lines 10-11, and page 12, lines 19-20. An exemplary delay lock loop 408 is disclosed in FIG. 4 and page 11, lines 8-13. The originally filed Patent Application discloses a frequency shift block 304 in FIG. 3 and page 10, lines 5-7. A timing acquisition unit 506, 1008 is disclosed in FIGS. 5 and 10 and page 11, lines 18-21 and page 17, lines 15-19.

It is believed that where the Examiner takes issue, is in the combination of the elements discussed above in a device for both the correction of carrier frequency offset and sampling frequency offset. The Examiner has interpreted the originally filed disclosure as setting forth groups of mutually exclusive "embodiments" directed to either embodiments "for digital correction of carrier frequency offsets" or embodiments "for digital correction of sampling frequency offset." First, the Examiner has overlooked **the embodiment of FIG. 1** that is clearly directed to the combination of both the correction of carrier frequency offset and sampling frequency offset. Secondly, the Examiner's characterization of the disclosure leaves out key words in defining what the preferred embodiments are directed to, and that characterization is contrary to the explicit disclosure made in the Patent Application as filed.

Figure 1 is directed to a non-enumerated embodiment ("**FIG. 1 illustrates a preferred embodiment**...", page 7, lines 5-7, *emphasis added*) that explicitly describes the invention as including both carrier frequency offset correction and sampling frequency offset correction. This initial embodiment discloses that "[a]ccording to an aspect of the invention.....each remote unit 100 corrects the

frequency **offsets** during transmission.....thus creating **a low IF modulation and interpolation effect**, before sending **the signal** to the analog front end circuitry" (page 7, lines 13-17, *emphasis added*). Here, the "invention" is described as correcting "frequency offsets," in both general and plural terms, not just the correction of the carrier frequency offset or the sampling frequency offset. Further, the "invention" is defined as providing a "low IF modulation," which is only the result of carrier frequency offset correction, and a "[low] interpolation effect," which is only the result of sampling frequency offset correction, and the those correction are applied to a "signal," in the singular, not separate signals that are output from circuits of different embodiments, that then passes to further circuitry.

The enumerated embodiments that follow in the disclosure then detail the circuits that can be used to respectively implement a particular type of frequency offset correction. The so called "first" embodiment specifically references a relationship to the embodiment of FIG. 1 in that it describes "a receiver in a remote unit 100..." (page 8, lines 9-12 and ref. numeral 100 is indicated in FIG. 2). The "second" (allegedly mutually exclusive) embodiment specifically references a relationship to the embodiment of FIG. 1 in that it describes incorporation of the elements of FIG. 5 in the transmitter portion of the remote unit 100 (page 12, lines 1-6). It would be apparent to one of ordinary skill in the art, at the time the subject Patent Application was filed, that the enumerated embodiments provide the circuit details for the embodiment of FIG. 1. If the

Examiner is going to give such great importance to the use of the term "embodiment," then the embodiment of FIG. 1 itself cannot be ignored, as apparently it has been.

The disclosed invention of the subject Patent Application is further described as being of benefit to "any modulation or diversity schemes that rely on accurate [carrier] frequency **and/or** time resolution [sampling frequency]," (page 7, line 21 - page 8, line 3) which clearly shows that the scope of the invention was contemplated as encompassing carrier frequency offset correction in and of itself, sampling frequency offset correction in and of itself, and the combination of both carrier frequency offset correction and sampling frequency offset correction. The ability to combine the disclosed circuits for individually correcting carrier frequency offset in the data transmission and correcting sampling frequency offset in the data transmission (embodiments 1 and 2, for example) in a single transceiver in order to practice the "invention", is well within the capability of one with ordinary skill in the art. The sufficiency of the disclosure must be evaluated from the perspective of one skilled in the art, Wang Labs., Inc. v. Toshiba Corp., 993 F.2d 858, 26 USPQ2d 1767 (Fed. Cir. 1993).

The Specification observes, in the Discussion of the Related Art, that "[c]onventionally, such frequency offsets are...detected and corrected during processing at the receiver end," albeit in considerably deficient manner since it is only at the receiver end (Page 2, lines 3-8). It observes that a known "receiver can employ a carrier frequency lock loop to determine the carrier frequency offset **and**

a delay lock loop to determine the sampling frequency offset," (Page 2, lines 4-6, *emphasis added*) which is only applied to the received signal. Therefore one skilled in the art understands how detection of both frequency offsets are detected in a single receiver, and based on the teachings of the embodiments of the subject Patent Application would, at the time the subject Patent Application was filed, have understood how to combine those embodiments in the remote unit 100 or base station 120.

There is nothing in the definition of the term "embodiment," preferred or otherwise, that limits the entire breath of a claimed invention, especially where that invention is described as including in its scope elements that are individually detailed in different embodiments. For instance, the Application sets forth "[a] first preferred embodiment of the **invention provides** for digital correction of carrier frequency offsets" (page 8, lines 8-9, *emphasis added*). The "invention provides" language is repeated each time an "embodiment" is discussed. There is nothing in the disclosure that explicitly limits the "**invention**" to be just one embodiment or another. This is particularly true where the problem to be overcome is that "...the **frequency offsets in both carrier frequency and sampling frequency will cause** the data from different users to overlap in both frequency and time..." (page 3, line 21 - page 4, line 4, *emphasis added*).

Clearly, the disclosure, by its own language, attributes no meaning to the term "embodiment" with respect an attribute of mutual exclusivity of one embodiment with respect to another. The first and second embodiments are

explicitly referenced to the "embodiment" of FIG. 1 that utilizes the combination of both the correction of carrier frequency offset and sampling frequency offset, indicating no intention for those three embodiments to be mutually exclusive. As for the third and fourth embodiments, they are respectively disclosed as alternative implementations of a portion of the circuitry of the first and second embodiments. Such description of alternative circuitry is inherently mutually exclusive. Thus, the term "embodiment" has been used in conjunction with circuits that are used in combination as well as circuits that are mutually exclusive alternatives. As a result, the term "embodiment" has no implicit relationship to mutual exclusivity and such relationship cannot be arbitrarily read into the term.

Throughout the Specification, it is clearly noted that there are two separate sources of frequency offset error that require correction: (1) carrier and (2) sampling frequency offsets – and that **both** should be corrected if the given communication system is to function properly. See page 3, line 21 - page 4, line 4. In fact, none other than the very first paragraph of the Specification states: "[t]he present invention relates to digital communications, and more particularly, to methods for correcting carrier frequency **and** sampling frequency at the transmitter to eliminate the effects of offsets in such frequencies," (Page 1; lines 7-10, *emphasis added*).

While the Specification, in the interests of clarity and brevity, describes the details of these corrections separately, the disclosure does not anywhere require or otherwise limit either type of correction to be used only at the exclusion of the

other. One skilled in the art implicitly understands that the analog and digital implementations of the invention or alternate circuit configurations for performing the same function are mutually exclusive as they are alternatives for one another. But no such implicit or any explicit limitation on combining the two types of frequency offset correction exist in the subject Patent Application. To the contrary, the Specification explicitly states that "in general" there are "two sources of frequency offsets: carrier frequency offsets **and** sampling frequency offsets" (page 1, lines 16-17, *emphasis added*), each resulting in a different problem (page 1, lines 17-20) and both of which must be corrected to eliminate the effects of carrier and sampling frequency offsets in a digital communication system (page 7, lines 10-13). The disclosure then unambiguously states that "[a]ccording to an aspect of the invention, therefore, **each** remote unit 100 corrects the frequency **offsets** during transmission..." (Page 7, lines 13-15, *emphasis added*). There is no question that each transceiver 100-1, 100-2,...., 100-n shown in FIG. 1 is, according to such "aspect of the invention," to be equipped for both carrier and sampling frequency offset correction measures "as will be described in more detail below" (which details follow in separate descriptions for correcting each source of error, each designated as embodiments of the invention).

Having thus provided an overview of the communication system generally disclosed in accordance with the invention, the Specification moves on to more closely describe, in turn, how each of the carrier and sampling frequency offsets may be reliably corrected - within each remote unit 100 represented in FIG. 1, as

well as the base station 120 (page 17, line 20 - page 18, line 4). The Specification follows this detailed description of each frequency offset correction scheme by stating "[t]his invention allows the transmitted signals from multiple sources to be frequency-locked to the receiver, **so that the signals from multiple sources are synchronized in both frequency and time**" (Page 18, lines 10-13, *emphasis added*). Such unambiguous description of the invention as being the combination of BOTH carrier frequency offset correction and sampling frequency offset correction cannot be overlooked or diminished in what it communicates to one skilled in the art. Even in a further alternative to the solution of correcting frequency offsets, the disclosure states that the alternative method provides the means "...so that the transmitter can adjust its carrier frequency **and/or** sampling frequency accordingly..." (Page 18, lines 16-19, *emphasis added*). So, here again, the Specification states that the two types of frequency offset correction can each be used separately (by use of the term **or**), as well as used in combination (by use of the term **and**). Even the Abstract as originally filed states, "[t]he present invention aims at eliminating the effects of frequency offsets between two transceivers...so that the signal received by the original transmitter is in sampling **and** carrier frequency lock with the original transmitter's local frequency reference," (Abstract, page 32 *emphasis added*).

Such unambiguous and repetitious disclosure as to both the rationale for, and the fact of, combining both carrier **"and"** sampling frequency offset corrections in the communication system "**embodiment**" shown in FIG. 1 belie

the Examiner's assertions to the contrary. The Specification not only contemplates the combined use of both carrier frequency offset correction and sampling frequency offset correction, it explicitly discloses an embodiment that discloses the use of that combination. Thus, the claimed subject matter of "using a common carrier frequency and a common sampling frequency"; "adjusting the common carrier and sampling frequencies"; "correct for errors in the carrier frequency and sampling frequency"; "a frequency lock loop and a delay lock loop"; "a frequency shift block and a timing acquisition unit," cannot be considered as new matter. Hence, the claims contain only subject matter that was described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the subject Patent Application was filed, had possession of the claimed invention. Accordingly, the rejection under 35 U.S.C. § 112, first paragraph, is improper.

Rejection of Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 under 35 U.S.C. § 112, second paragraph.

The Examiner makes much of the fact that the disclosure describes correction of carrier frequency offset in a "first embodiment," which encompasses FIGS. 2 and 3, and the correction of sampling frequency offset in a "second embodiment, encompassing FIGS. 4 and 5. As discussed Supra, the explicit statement justifying claims directed to a device and method that combines carrier

frequency offset correction and sampling frequency offset correction (page 7, lines 13-17), is discussed in relationship to "**a preferred embodiment**" that is illustrated in FIG. 1 (page 7, lines 5-7, *emphasis added*). That embodiment forms the basis for the detailed discussion of the constituent circuits that may be incorporated in the remote unit 100 or base station 120, and for which the combination of both types of frequency offset correction is contemplated.

Contrary to the Examiners interpretation of Applicants' use of the term "embodiment, as also discussed Supra, the description of the first embodiment specifically references a relationship to the embodiment of FIG. 1 and so does the description of the second embodiment, clearly indicating the respective "embodiments" are intended to show a more detailed description of respective portions of the invention. And, that invention is explicitly described as combining carrier frequency offset correction and sampling frequency offset correction. In light of the explicit disclosures of the combination of the two types of correction and the combination of the so called first and second embodiments with the embodiment of FIG. 1, the Specification cannot be interpreted as a disclosure of just mutually excusive inventive concepts. Certainly one of ordinary skill in the art, at the time the subject Patent Application was filed, would not interpret it so.

The Examiner's interpretation is a direct contradiction of the explicit disclosure made in the originally filed Patent Application. While the disclosure of the subject Patent Application may not "fit the mold" of other Patent Applications with which the Examiner has become familiar, the subject Patent Application must

be interpreted based on the content of its own disclosure. Based on that disclosure, when considered in its entirety, there is no basis for the Examiner's conclusion of mutual exclusivity of carrier frequency offset correction vs. sample frequency offset correction.

Thus, contrary to the Examiner's rational for rejection, the Specification, as originally filed, clearly evidences the scope of the invention to include the combination of carrier frequency offset correction and sampling frequency offset correction. Accordingly the claims do clearly set forth the subject matter that Applicants regard as the invention, and therefore the rejection under 35 U.S.C. § 112, second paragraph, is improper.

Conclusion

In summation, Applicants submit that the Examiner's basis for rejection of the Claims is without merit for the following reasons:

1. The Specification, as originally filed, clearly and unambiguously describes the embodiment of FIG. 1 as representing communications devices employing the invention, which invention combines carrier frequency offset correction and sampling frequency offset correction. The Specification, as originally filed, further makes clear that each of the identified first and second embodiments are incorporated in the communication devices of the embodiment

of FIG. 1. Therefore, Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 are fully enabled by the Specification.

2. The Specification, as originally filed, clearly evidences a disclosed embodiment that describes the invention as a combination of carrier and sampling frequency offset correction and illustrated in FIG.1. The Specification, as originally filed, further sets forth other enumerated embodiments that are each directed to a respective portion of the embodiment of FIG.1, providing details of the circuit elements of the carrier frequency offset correction and sampling frequency offset correction. Therefore, Claims 1, 4, 5, 8, 9, 15, 18, 19, 22, 23, 29, 31, 34 and 35 particularly point out and distinctly claim the subject matter that Applicants regard as the invention.

For all of the foregoing reasons, Appellants respectfully submit that the invention as claimed in the subject Patent Application is adequately described in the Specification to allow one skilled in the art to make and/or use the invention and particularly point out and distinctly claim the subject matter that Applicants regard as the invention; and, that the Claims on Appeal are allowable. Appellants accordingly request that the Examiner's rejection of the appealed Claims be reversed.

In the event there are any further charges associated with the filing of this Appeal Brief, the Honorable Commissioner of Patents is authorized to charge Deposit Account #18-2011 for such charges.

Respectfully submitted,
For: ROSENBERG, KLEIN & LEE

David I. Klein
Attorney for Applicant/Appellant
Registration No. 33,253

Dated: 16 April 2008

APPENDICES

CLAIMS APPENDIX

CLAIMS ON APPEAL

Listing of Claims:

1. A device adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA, comprising:

a first transceiver unit operable to communicate in continuous bi-directional manner for the direct exchange of information with a second transceiver unit using a common carrier frequency and a common sampling frequency;

means for detecting responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units in at least one first signal transmitted by the first transceiver unit and received by the second transceiver unit disposed remotely therefrom;

means for adjusting the common carrier and sampling frequencies in accordance with the offsets detected responsive to the continuous comparison of received and detected signals in at least one second signal to be transmitted by the second transceiver unit and to be received by the first transceiver unit to correct for errors in the carrier frequency and sampling frequency references used locally at the first transceiver unit, so that the effects of the offsets to be perceived by the

first transceiver unit will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the first transceiver unit.

4. A device according to claim 1, wherein the means for detecting the offsets includes means for performing a correlation on a digital representation of the first signal so as to lock onto the offset in the carrier frequency.

5. A device according to claim 1, wherein the means for adjusting the common frequencies includes means for digitally shifting data in frequency to be transmitted in accordance with the carrier frequency and the offset corresponding thereto.

8. A device according to claim 1, wherein the means for detecting the offsets includes means for locking onto the offset in the carrier frequency and for producing an output signal corresponding thereto.

9. A device according to claim 8, wherein the means for adjusting the common frequencies includes means for variably adjusting a reference frequency output by a crystal oscillator in accordance with the output signal generated by the locking means.

15. A method adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA, wherein the communication system comprises a first transceiver unit operable to communicate in continuous bi-directional manner for the direct exchange of information with a second transceiver unit using a common carrier frequency and a common sampling frequency, the method comprising:

detecting responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units in at least a first signal transmitted by the first transceiver unit and received by the second transceiver unit disposed remotely therefrom; and,

adjusting the common carrier and sampling frequencies in accordance with the offsets detected responsive to continuous comparison of received and detected signals in at least one second signal to be transmitted by the second transceiver unit and to be received by the first transceiver unit to correct for errors in the carrier frequency and sampling frequency references used locally at the first transceiver unit, so that the effects of the offsets to be perceived by the first transceiver unit will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the first transceiver unit.

18. A method according to claim 15, wherein the step of detecting the offsets includes performing a correlation on a digital representation of the first signal so as to lock onto the offset in the carrier frequency.

19. A method according to claim 15, wherein the step of adjusting the common frequencies includes digitally shifting data in frequency to be transmitted in accordance with the carrier frequency and the offset corresponding thereto.

22. A method according to claim 15, wherein the step of detecting the offsets includes locking onto the offset in the carrier frequency and producing an output signal corresponding thereto.

23. A method according to claim 22, wherein the step of adjusting the common frequencies includes variably adjusting a reference frequency output by a crystal oscillator in accordance with the output signal generated by the locking means.

29. A device adapted to be used in a first transceiver unit that can communicate with a second transceiver unit using a common carrier frequency and a common sampling frequency, the device comprising:

a frequency lock loop and a delay lock loop respectively coupled to receive digital representations of at least one first signal transmitted by the second transceiver unit, the frequency and delay lock loops being adapted to detect comparative carrier and sampling frequency offsets in the first signal and to produce offset information corresponding thereto indicative of offsets between respective common frequency references locally used for the carrier and sampling frequencies at the first and second transceiver units; and

a frequency shift block and a timing acquisition unit coupled to receive the offset information and digital data to be transmitted by the first transceiver unit in at least one second signal to be received by the second transceiver unit disposed remotely therefrom, the frequency shift block and timing acquisition unit being respectively adapted to digitally shift and sample the digital data in frequency in accordance with the common frequencies and frequency offsets corresponding thereto to correct for errors in the carrier and sampling frequency references used locally at the second transceiver unit, so that the effects of the carrier and sampling frequency offsets to be perceived by the second transceiver unit will be substantially reduced in preemptive manner for continuous wireless bi-directional communication between the first and second transceiver units for the direct exchange of information.

31. A device adapted to be used in a first transceiver unit that can communicate with a second transceiver unit disposed remotely therefrom using a common carrier frequency and a common sampling frequency, the device comprising:

a frequency lock loop and a delay lock loop respectively coupled to receive digital representations of at least one first signal transmitted by the second transceiver unit, the frequency and delay lock loops being adapted to detect comparative carrier and sampling frequency offsets in the first signal and to produce analog offset signals corresponding thereto indicative of offsets between respective common frequency references locally used for the carrier and sampling frequencies at the first and second transceiver units;

a crystal oscillator that supplies a reference frequency for modulating at least one second signal to be perceived by the second transceiver unit in accordance with the common carrier frequency; and

variably adjustable devices coupled to receive the offset signals, the variably adjustable devices being respectively adapted to adjust the reference frequency of the crystal oscillator and a sampling clock of an analog-to-digital converter in accordance with the offset signals to correct for errors in the carrier and sampling frequency references used locally at the second transceiver unit, so that the effects of the carrier and sampling frequency offsets in the second signal to be perceived by the second transceiver unit will be substantially reduced in

preemptive manner for continuous wireless bi-directional communication between the first and second transceiver units for the direct exchange of information.

34. A device adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA, the device comprising:

a first transceiver unit operable to communicates in continuous bi-directional manner for the direct exchange of information with a second transceiver unit using a common carrier frequency and a common sampling frequency;

means for detecting responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units in at least one first signal transmitted by the first transceiver unit and received by the second transceiver unit disposed remotely therefrom;

means for communicating information corresponding to the detected offsets from the second transceiver unit to the first transceiver unit; and,

means for adjusting the common carrier and sampling frequencies in accordance with the offsets detected responsive to continuous comparison of received and detected signals in at least one second signal to be transmitted by the first transceiver unit and to be received by the second transceiver unit to correct

for errors in the carrier frequency and sampling frequency references used locally at the second transceiver unit, so that the effects of the offsets to be perceived by the second transceiver unit will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the second transceiver unit.

35. A device adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA, the device comprising:

a first transceiver unit operable to communicate in continuous bi-directional manner for the direct exchange of information with a second transceiver unit using a common carrier frequency and a common sampling frequency;

means for detecting responsive to a continuous comparison of received and detected signals comparative offsets between respective common frequency references used for the carrier and sampling frequencies locally by the first and second transceiver units in at least one first signal transmitted by the first transceiver unit and received by the second transceiver unit disposed remotely therefrom;

means for communicating information corresponding to the detected offsets from the second transceiver unit to the first transceiver unit; and,

means for adjusting the common carrier and sampling frequencies in accordance with the offsets detected responsive to continuous comparison of received and detected signals in at least one second signal to be transmitted by the second transceiver unit and to be received by the first transceiver unit to correct for errors in the carrier frequency and sampling frequency references used locally at the first transceiver unit, so that the effects of the offsets to be perceived by the first transceiver unit will be substantially reduced in preemptive manner, the second signal to be transmitted being thereby adjusted to be in substantial frequency lock with the common carrier frequency reference of the first transceiver unit.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.

APPLICATION DRAWINGS APPENDIX

Five (5) Sheets.

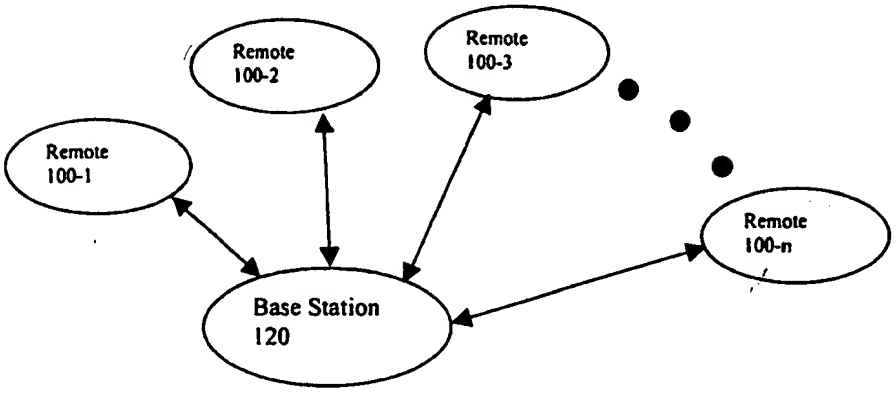

FIG. 1

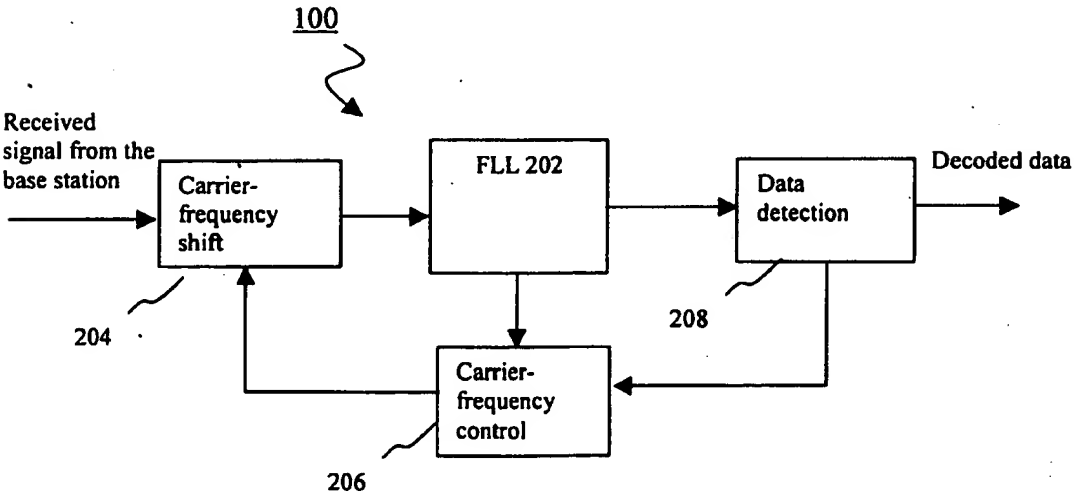

FIG. 2

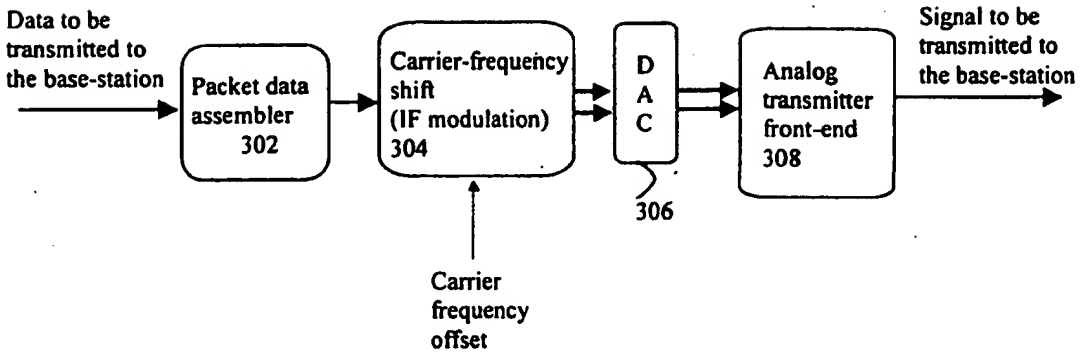
Data to be transmitted to the base-station
Packet data assembler 302
Carrier-frequency shift (IF modulation) 304
D A C
306
Analog transmitter front-end 308
Signal to be transmitted to the base-station
Carrier frequency offset

FIG. 3

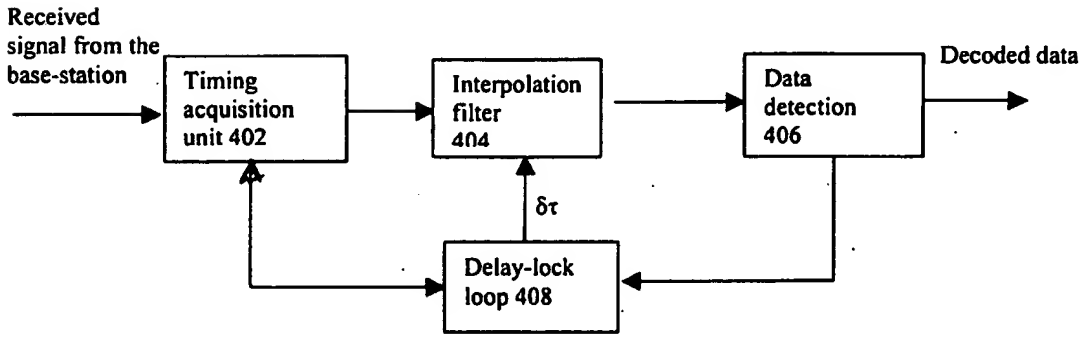
Received signal from the base-station
Timing acquisition unit 402
Interpolation filter 404
Data detection 406
Decoded data
δτ
Delay-lock loop 408

FIG. 4

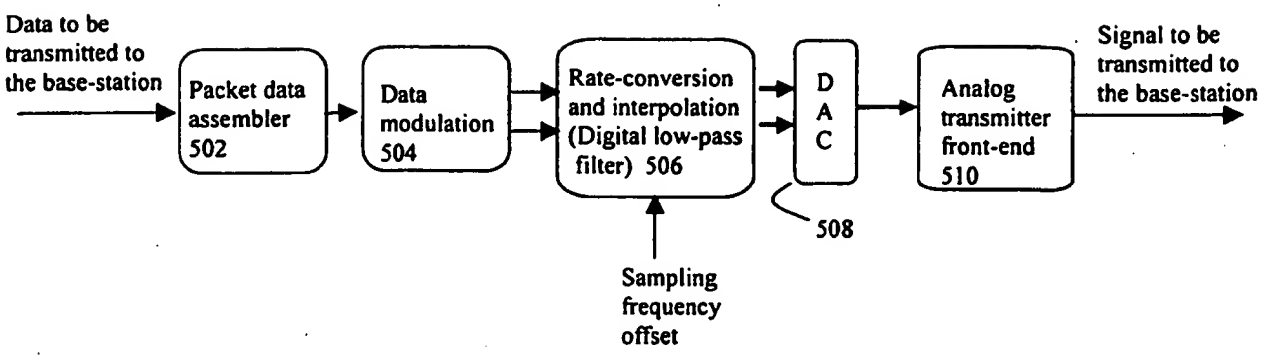
Data to be transmitted to the base-station
Packet data assembler 502
Data modulation 504
Rate-conversion and interpolation (Digital low-pass filter) 506
D A C
508
Analog transmitter front-end 510
Signal to be transmitted to the base-station
Sampling frequency offset

FIG. 5

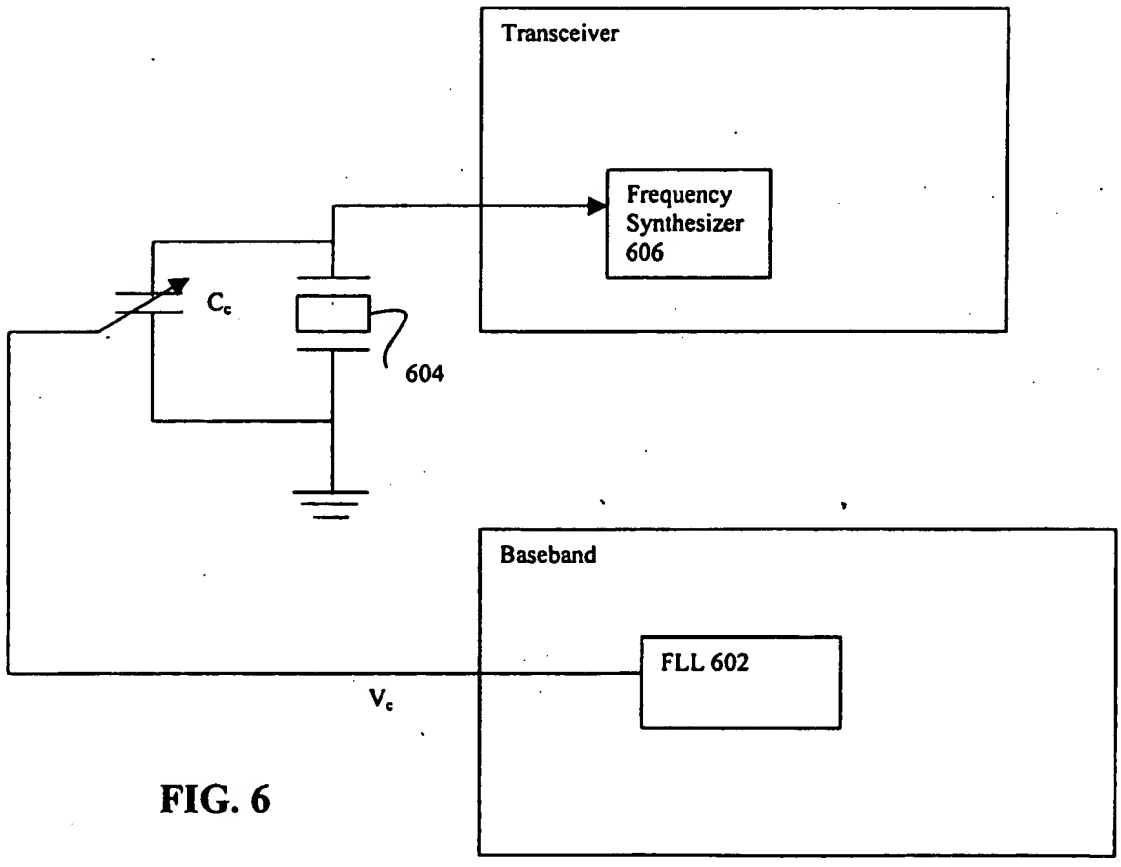
Transceiver
Frequency Synthesizer 606
C_c
604
Baseband
FLL 602
V_c

FIG. 6

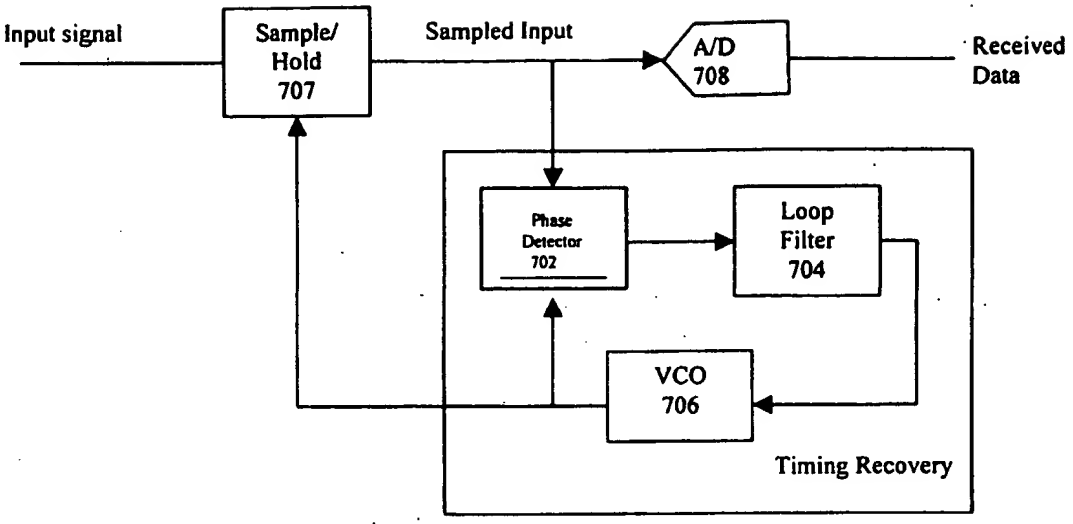
Input signal
Sample/
Hold
707
Sampled Input
A/D
708
Received
Data
Phase
Detector
702
Loop
Filter
704
VCO
706
Timing Recovery

FIG. 7

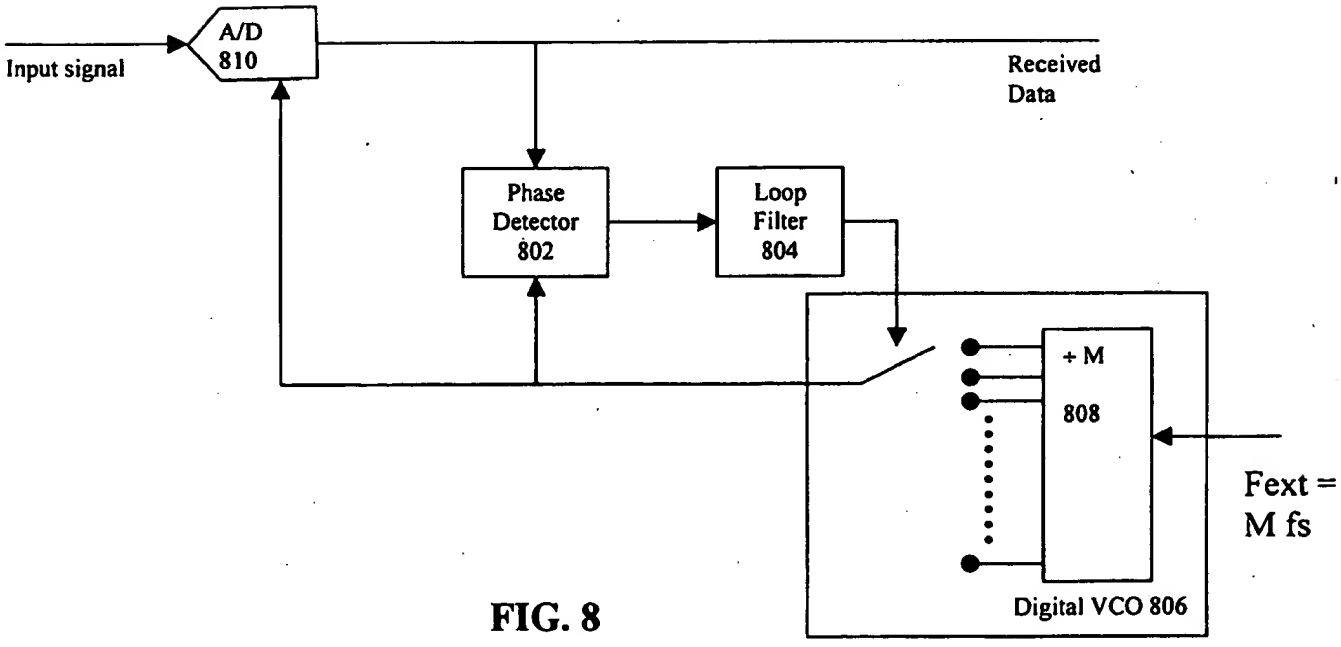
Input signal
A/D
810
Received
Data
Phase
Detector
802
Loop
Filter
804
+ M
808
Fext =
M fs
Digital VCO 806

FIG. 8

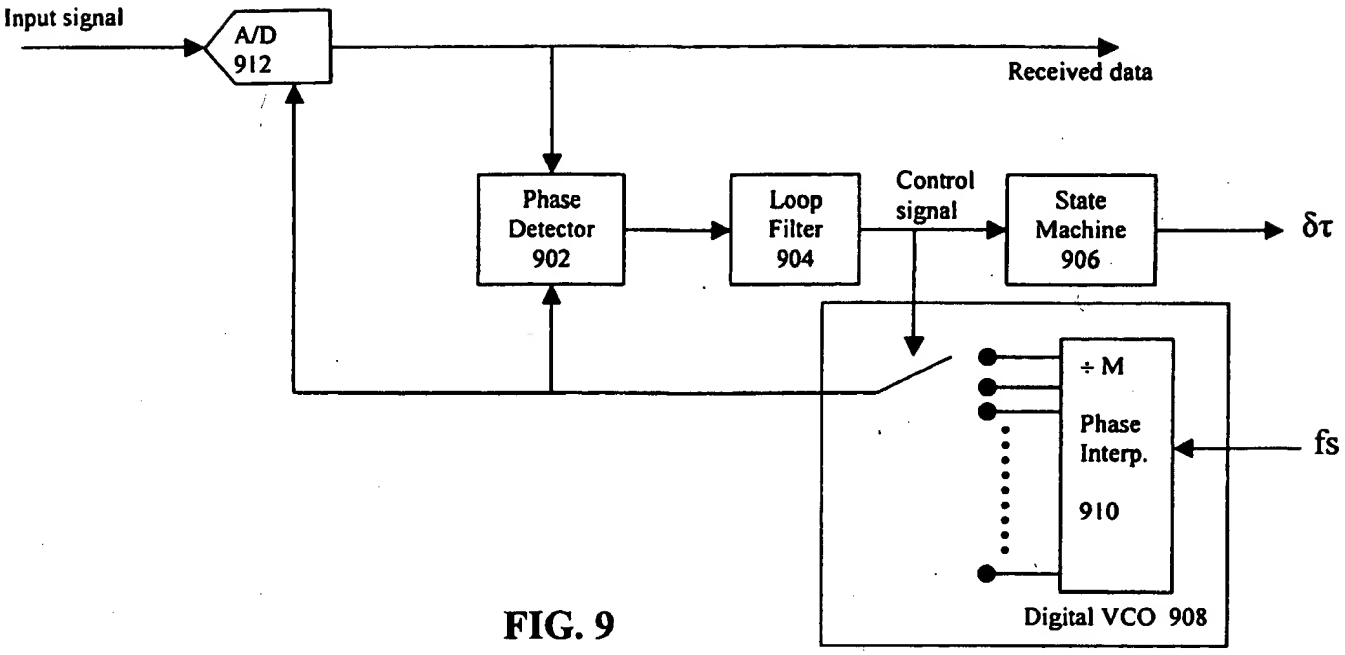
Input signal
A/D
912
Received data
Phase
Detector
902
Loop
Filter
904
Control
signal
State
Machine
906
δτ
÷ M
Phase
Interp.
910
fs
Digital VCO 908

FIG. 9

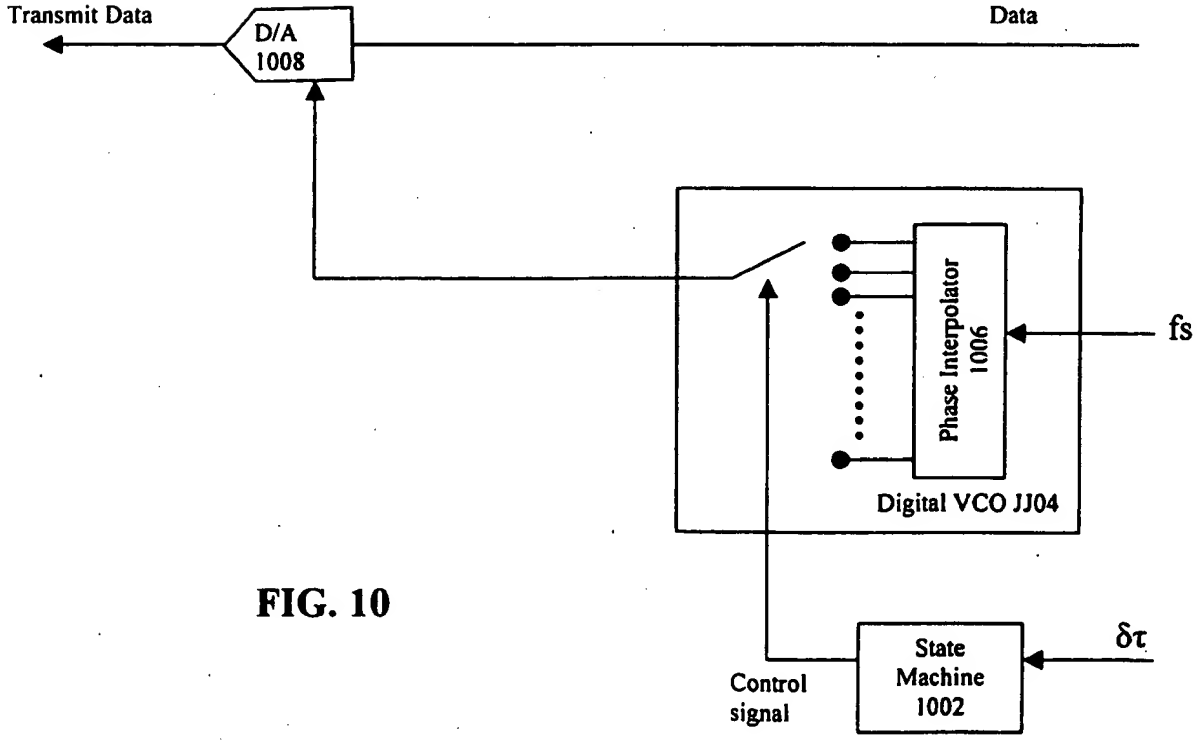
Transmit Data
D/A
1008
Data
Phase Interpolator
1006
fs
Digital VCO JJ04
Control
signal
State
Machine
1002
δτ

FIG. 10